ROLE OF REAL TIME B-SCAN ULTRASOUND IN OCULAR AND ORBITAL PATHOLOGY

THESIS
FOR

MASTER OF SURGERY
(OPHTHALMOLOGY)

M.L.B. MEDICAL COLLEGE
BUNDELKHAND UNIVERSITY,
JHANSI (U.P.)

2003 PRADEEP AGARWAL

Dedicated to my parents and my loving wife, Nishi

Certificate

This is to certify that the work entitled **"ROLE OF REAL TIME B-SCAN ULTRASOUND IN OCULAR AND ORBITAL PATHOLOGY"** which is being submitted as a thesis for M.S. (Ophthalmology) Examination 2003, of Bundelkhand University, has been carried out by **Dr. Pradeep Agarwal**. The techniques embodied in this thesis were undertaken by the candidate himself and the observations recoded were checked and verified by me from time to time.

Dated: 14 MAY 2003

Dr. B.S. Jain MS
~~Head of Department~~,
Department of Ophthalmology,
MLB Medical College,
Jhansi.

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(Co-Guide)

When it comes to expressing he heartfelt gratitude of those who were the heart and soul of this work, I can barely sum up by saying "when the heart is full the tongue is silent". Words if hey could be adequately used would perhaps still not suffice in bringing forth the totality of my gratefulness to those concerned. Nevertheless, I will certainly not spare this fortunate opportunity of conveying my feelings in all their humility.

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Pradeep Agarwal

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– ***Pradeep Agarwal***

CONTENTS

Introduction

INTRODUCTION

The possession and use of the faculty of sight has always been one of the most cherished gifts of mankind. From time immemorial, it has been the most valued special sense.

Detection of abnormalities that cannot be visualized clinically due to opaque light conducting ocular media i.e. cornea, aqueous, lens, vitreous has been a limitation of diagnosis in ophthalmology in the past. Such circumstances occur frequently in trauma, inflammatory, neoplastic and congenital abnormalities, which obscures the view and makes thorough clinical examination impossible. Ultrasonography has emerged in recent years as a useful technique for detecting and outlining soft tissue abnormalities of the eye regardless of intervening opacities or tissues.

Ultrasonography is a painless, non-invasive, well tolerated and a non-toxic diagnostic technique. B-Scan ultrasound is primarily used because it provides two dimensional sections of the orbit, facilitating orientation and recognition of normal or pathologic ocular ultrasonic tissue patterns. It is a modality that is a safe, portable inexpensive and easily repeated thus helping to study the incidence, timing and evolution of ocular lesions. It is an ideal method for screening in ocular trauma.

There has been recently a greater awareness of the sub group constituted by such patients with corneal, lenticular or vitreal opacities, in whom a presurgical evaluation is necessary for various diagnostic purposes. In such

patients the B-Scan provides quick, sensitive and specific information regarding the status of the posterior segment. Effective medical and surgical therapy is thereby enhanced with ultrasonic evaluation. It is also valuable for postoperative follow-ups and early detection of recurrences. So, now it is often the appropriate first line investigation following clinical evaluation.

This study was conducted to review the role of real time B-Scan ultrasound in ocular and orbital pathologies.

Review of Literature

REVIEW OF LITERATURE

HISTORICAL REVIEW

Ophthalmology has been a relative late comer to utilization of ultrasound diagnostic technique. B-Scan ultrasonography found wide spread use in evaluation of abdominal abnormalities, particularly in obstetrics and gynaecology, where foetal outline and positions, placental localization and abnormal pelvic masses are easily definable [Baum G,Greenwood I, 1960]. Ultrasound is apparently non-toxic to the foetus. Application of A-mode ultrasonography to the eye was first described by Mundt and Hughes in 1956 and elaborated extensively by Goldberg and Sarin(1967), Oksala and Bronson(1969), Ossoinig(1972) and many others. The use of B-Scan ultrasonography was initiated in ophthalmology by Baum and Greenwood (1958) and developed further by Purnell(1967) and Sokollu(1969) independently. In recent years Coleman and associates(1969) have achieved greater sophistication with B-Scan techniques.

In ophthalmology three types of ultrasonic systems are used .Each of this present morphologic information in a distinctive display format. They are known as-

A- mode system

B- mode system

M- mode system

A-mode graphically displays tissue boundaries as a function of distance along any selected axis. This system, the first to be used in ophthalmology is important for quantifying echo characteristics and for biometric applications [Coleman D. J., Dallow R. L., Smith M. E., 1979]

B-mode system introduced in the late 1950's,produces cross sectional representation of ocular and orbital anatomy which can be readily interpreted. These images have proven extremely useful in the diagnosis of a broad spectrum of disease state [Coleman D.J., Dallow R.L., Smith M.E. 1979]

M-mode system presents graphical density showing time histories of tissue motion along a selected axis of the eye [Coleman D.J.,Weininger R.1969]

Now that ultrasonography is readily available in both the A-mode and the B-scan method, it has rapidly become an indispensable and essential diagnostic technique in ophthalmology. It is more useful when other methods of clinical examinations are inadequate specially with opaque media [Coleman D.J. Konig W.F. & Kaiz L 1969].

In 1956, Henry Mundt and William Hughes in an article entitled 'Ultrasounds in ocular diagnosis'recorded the first use of ultrasound in ophthalmology based on the previous work by Ludwig and Stuthers in 1949 and Weild & Reid in 1952.The literature on diagnostic ultrasound in ophthalmology began with Oksala (1957). In this year Oksala and Lehtinen published their first observation utilizing ultrasonic waves in the diagnosis of retinal detachment.

In the numerous papers that followed, Okasala reported diagnosis with ultrasound in rupture of thin sclera, choroidal detachment, retinoblastoma, intraocular foreign bodies, coat's disease and vitreous opacities. In all these experiments Oksala used unidimentional method. Baum and Greenwood (1958) were the first investigators to use two dimensional method of ultrasound in ophthalmology [Mc Quown D.S. 1975].Since then many advances have been made in the use of ultrasound in ophthalmology.

NORMAL ANATOMY

The orbits are a pair of bony cavities that contains eyeballs, their associated muscles, nerves, vessels, fat, and most of the lacrimal apparatus. The orbital opening is guarded by two thin movable folds, the eyelids, which are situated in front of the eye. The orbit is a pyramid shaped cavity with its base in front and its apex behind. The orbital margin is formed above by the frontal bone, which is notched for the passage of the supraorbital nerve and vessels. The lateral margin is formed by the process of the frontal, zygomatic bone and the maxilla. [Last R.J.-1966].

The eyeball is embedded in orbital fat but is separated from it by the facial sheath of the eyeball [Berry M., Bannister L.H., Standering S.M 1995]. The eyeball is a complex structure, the role of which is to direct gaze towards the object of interest in the visual field and transmit light faithfully to the retina [Edwards L.F. 1956]. The eyeball consists of three coats; which from without

inward, are: (1) The fibrous coat (2) The vascular pigmented coat and (3) The nervous coat. [Snell R.S. 1992].

The fibrous coat is made up of a posterior opaque part, the sclera and an anterior transparent part, the cornea. The sclera is composed of dense fibrous tissue and is white in color. Posteriorly it is pierced by the optic nerve and is fused with the dural sheath of that nerve [Berry M., Bannister L.H., Standering S.M. 1995].

The vascular pigmented coat consist, from behind forward, of the choroid, the ciliary body and the iris.

The retina consists of an outer pigmented layer and inner nervous layer. Its outer surface is in contact with the choroid and its inner surface is in contact with vitreous body. The posterior three-quarters of the retina is the receptor organ. Its anterior edge forms a wavy ring, the ora serrata, and it is here that the nervous tissues end [Kanski J.J -1989].

The aqueous humor is a clear fluid that fills the anterior and posterior chambers of the eyeball. It is believed to be a secretion or transudate from the ciliary processes; the function of which is to support the wall of the eyeball by exciting internal pressure. It also nourishes the lens and removes the products of metabolism; these functions are important because the lens does not possess a blood supply [William P.L.-1989]

The vitreous body fills the eyeball behind the lens. It is a transparent gel enclosed by the vitreous membrane. No blood vessels are found in vitreous body. The function of the vitreous body is to contribute slightly to the magnifying power of the eye. It supports the posterior surface of the lens and assists in holding the neural part of the retina against the pigmented part of the retina. [LastR.J.-1966].

B-SCAN ULTRASONOGRAPHY

The B-mode greatly expanded the role of ultrasound as a diagnostic tool. This produces a picture of a slice of tissue. [Dallow R.L. 1975].

OCULAR SONOGRAPHY

The eye is an ideal organ for ultrasonography. It is spherically shaped and divided in to anterior and posterior segment. These are normally filled with optically and acoustically clear fluids that possess the acoustic properties of normal saline [Coleman D.J. et al. 1992]

Indications of ocular scanning:

1. Any eye with opaque media, especially if an intraocular lesion is suspected or prior to anterior segment surgery if the posterior pole can not be evaluated by standard optical methods.

2. Atypical retinal detachments.

3. Trauma where visual evaluation has been lost in order to determine structural changes and for localization of foreign bodies.

4. Most vitreous haemorrhages.

5. Determination of axial length of the globe.

6. Diagnostic evaluation of intraocular pathology and retrobulbar masses.

7. Therapeutic and destructive uses in the eye.[Arthur H.1979].

ORBITAL SONOGRAPHY

The ultrasonography is a harmless, painless procedure that can qualititaviely and quantitaviely evaluate various orbital abnormalities. The internal reflictivity can be correlated with its histologic features. The availability to recognize by Ultrasonography techniques, the subtle changes in size and thickness of normal orbital structure provides an additional contribution in orbital diagnosis. The non invasive nature of this harmless procedure taking 10-15 minutes to perform [Levine R.A. 1987].

A relative pseudoexophthalmos or enophthalmos because of large or small globe can be readily ascertained. US may be the only means of preoperatively identifying, localizing and studying some orbital lesions and is a logical initial diagnostic test in the evaluation of exophthalmos whose results can direct further studies and help in planning the surgical approach.

Indications for Orbital Scanning:

1. Unilateral or bilateral exophthalmos
2. Enophthalmos.
3. Grave's disease suspect.
4. Papilledema or optic nerve atrophy.
5. Retinal striae or any globe displacement.
6. foreign body detection.
7. Evaluation of a known lesion for size, shape, borders, extension, localization, consistency and type or to follow growth or response to treatment or detect recurrence [McQuown D.S.-1975]

METHODS

B-mode ultrasonography can be performed by either, a contact method or an immersion method [Mc Quown D.S. 1975].

CONTACT METHOD

In this method the transducer is placed on the patients skin or cornea with a coupling substance acting to exclude air. Orientation of the transducer probe from several directions produce echo dots from different aspects of the object eye. The B-scan images appear on a television type screen to real time e.g. continuously moving as the probe position or eye moves. This device has

proven satisfactory for detecting most types of intraocular pathology [Coleman D.J., Konig W.E. & Kalz L. 1969].

IMMERSION METHOD

In the immersion technique the transducer is applied with a water-bath stand off. In order to perform more sophisticated B-scan ultrasonography, it is necessary to have the eye completely surrounded by water. A practical method devised by Coleman, Konig and Kalz uses a flexible plastic bag attached to the plastic rim and filled with saline to cover the eye while the patient lies supine. It is non traumatic to the eye, not uncomfortable, and leaking is not a problem. [Coleman D.J., Konig W.E. & Kalz L1969].

Advantages of immersion technique:

1- Permits serial scanning.

2- Permits resolution of anterior ocular structures.

3- Gives improved resolution of all ocular structures.

4- Allows inter –change of transducer.

5- Avoids globe compression.

Disadvantages:

1. More time consuming.
2. Not easily performed in children.
3. It is not possible to examine the whole eye from as many directions as with contact method. [Coleman D.J., Lizzi F.L. & Jack R.L. 1977]

B-SCAN ORIENTATION-

The three basic B-scan orientations that are used to evaluate the intraocular lesions are transverse, longitudinal and axial. The transverse and longitudinal scans are used most commonly because the probe is placed on the conjuctiva. Thus the sound beam bypasses the lens, allowing better sound penetration. Scanning is performed with the patients gaze directed away from the probe towards the meridian being examined. This allows a wide surface of globe on which to place and shift the probe. [Atta H.R.-1996].

AXIAL SCAN

In the axial scan, the patient fixates in primary gaze and the probe is placed on the centre of the cornea, thereby displacing lens and optic nerve in the centre of the echogram. The sound beam is then directed through the centre of the lens, sweeping along the two apposing meridians. This scan is easiest for echographers to use and understand. This position can be helpful in some

situations for documenting lesions and membranes in relation to lens and optic nerve. It can also be useful for evaluating the macular lesion.

When a horizontal B-scan is performed the marker oriented towards patient's nose, which places the macula just below the optic disc in the echogram [Atta H. R.-1996]

TRANSVERSE SCAN

The probe in transverse scan is placed on the globe with longest diameter of the oval shaped probe oriented parallel to the limbus. In this way, the back and forth movement of the transducer also occur parallel to the limbus. The sound beam oscillates back and forth across the opposite fundus, producing a circumferential slice for showing the lateral (circumferential) extent of the lesion.[Atta H.R.-1996]

LONGITUDINAL SCAN

For longitudinal scanning there is a change in orientation. The probe face is rotated 90 degrees from the position used for the transverse scan. The longest diameter of the probe is placed perpendicular to the limbus. The sound beam then sweeps along the meridian opposite the probe rather than across the meridian, in contrast to the transverse scan. The longitudinal scan shows the antero-posterior extent of a lesion rather than the lateral extent [Atta H.R.-1996]

TYPES OF SCANNING

B-mode system can employ various scan patterns. The most useful patterns are those in which the ultrasonic beam is perpendicularly aligned with reflective tissue surfaces. The following are the types of scanning.

LINEAR SCAN

It can be done perpendicularly only over small segments of curved ocular surfaces such as those of the retina and provides limited study of the eye.

SECTOR SCAN

Sector scan patterns are more compatible with these curved surfaces and allow echoes from large segments of posterior surface to be captured for B-mode presentation.

ARC SCAN

Arc scan pattern also permits perpendicular alignment over large ocular region.

COMPOUND SCAN

Compound scan combine several scan motions to achieve the most complete coverage of the eye and orbit. The compound scan pattern combines a repetitive sector scan superimposed on a slower linear scan. With this

combination each tissues element is viewed from several directions. Another useful compound scan pattern combines sector and arc scans.

[Coleman D.J.-1973]

EXAMINATION

BASIC EXAMINATION TECHNIQUE

This is performed to detect lesions in eyes with opaque ocular media. In this technique transverse scans of the four major quadrants are performed initially at a high gain setting. The superior portion of the globe is first scanned with the patient's gaze directed superiorly. The probe is oriented horizontally with it's face placed next to the inferior limbus and centered on the 6o'clock meridian, the probe is then shifted towards the lower fornix, thus screening progressively more peripheral portions of the globe. As the probe is shifted, the echographer continuously monitors the scan to detect abnormal echoes. The nasal portion of the eye is next examined by having the patient look medially and by placing the probe in a vertical orientation with probe's face centered on the temporal limbus. Again the probe is shifted from limbus to fornix, thereby scanning the nasal half of the eye. Similarly the eye should be screened using longitudinal scans along the four major meridians.

Once the posterior segment has been evaluated with the transverse and longitudinal approaches, the globe is then evaluated with both vertical and horizontal axial scans.

The B-scan screening is performed at high and low gain settings. The high settings are used to detect vitreous opacities and gross fundal lesions, whereas the lower settings (which improve resolution) are helpful for detecting relatively flat fundal lesions and for better showing the topography of large lesions. [Shammas H.J.-1989]

Because of the importance of the macular region, it is essential that it should be evaluated carefully to detect any abnormality. Several approaches are available. There are four basic B-scan probe positions that allow perpendicular sound beams to the macula. These include the-

1-Horizontal axial

2- Vertical transverse

3- Longitudinal

4- Vertical macular approach- This is done by first performing a vertical axial scan. The sound beam is then aimed slightly temporal to the optic nerve, to display a vertical section through the macula.

[Atta H.R.-1996]

SPECIAL EXAMINATION TECHNIQUE

These (i.e. topographic, quantitative and kinetic echography) have been devised by Ossoing.

Topographic B-Scan examination

As soon as lesion is detect, topogrphic evaluation of the lesion is then per formed. The lesion is first assessed with the appropriate transverse B-scan approach. The probe is then shifted from limbus to fornix, thereby sweeping the sound beam through the lesion from posterior to anterior. This displays the gross shape and dimensions of the lesion as well as its lateral extent. [Atta H.R.-1996].The longitudinal approach is then applied, with the sound beam oriented radially, perpendicular to the transverse view. The lesion's antero-posterior extent is assessed and its shape and gross dimensions are evaluated.

Quantitative echography

Once the topographic findings have been ascertained, quantitative echography is performed. It determines the reflectivity, internal structure, and sound attenuation of the lesion. Two types of quantitative echography have been described.

TYPE 1 is used to estimate the reflectivity of all detected lesions. Reflectivity is evaluated by observing the single brightness on B-scan. The sound beam must always be directed perpendicular to the lesion being assessed. It is also important to evaluate a lesion reflectivity from different sound sources in order to obtain an adequate overall estimate of the lesion's character. Several different types of lesions can be associated with quantitative echography. These include membranes and bands, opacities, foreign bodies and tumors (this reflectivity is linked to their configuration, size, density and

thickness).[Shammas H.J.-1989]. The reflectivity of tumor however is linked to it's histologic architecture, such as the character of the cellular substances, the number and distribution of cell aggregates, and the presence of large interfaces such as blood vessels, septa, calcification and so forth.

On B-scan echograms, the assessment of signal brightness is only a very gross estimation. In order to asses the significance of a lesions signal brightness on B-scan, the signal must be compared with that of either the normally highly reflective sclera or the very low reflectivity of the vitreous. Lesions showing internal reflectivity; in comparison to those known tissues, is assessed in different degrees for echo density. Therefore, the most useful quantitative information obtained with B-scan is from lesions that are extremely echodense or echolucent [Shammas H. J-1989].

Internal structure-

Internal structure refers to degrees of variation in histological architecture within a mass like lesion. This is evaluated by noting differences in echo density on B-scan echograms. Regular internal structure is represented by a uniform appearance of echoes.Conversely, irregular internal structure is represented by a marked differences in echo appearance. In some cases, slight variation may be present and the lesion will be classified as moderately irregular [Atta H.R.-1996].

Sound attenuation-

Sound attenuation occurs when the sound energy is scattered, reflected, or absorbed by a given medium. Sound attenuation may be evaluated on B-scan and is indicated by a progressive decrease in the strength of the echoes, either within or posterior to the lesion. Various substances, such as bone, calcium and most foreign bodies typically produce strong attenuation. This results in a decrease in signal strength or an actual void posterior to the lesion (shadowing).

TYPE 2 is used solely to differentiate a retinal detachment from a dense vitreous membrane [Shammas H.J.-1989].

Kinetic echography

One of the unique abilities of the contact method is the almost simultaneous display of echoes. Therefore, any movement of or within a lesion is accurately depicted in the echogram (i.e.in real time).Two types of motion (i.e. after – movement and vascularity) can be detected with the appropriate instruments. After- movement ; indicative of mobility, is determined by observing motion of the lesion echoes following cessation of eye movement . A solid does not move. Vascularity means spontaneous motion of echoes; on the screen it represents blood flow within vessels. [Atta H.R.-1996].

ULTRASONOGRAPHIC APPEARANCE OF COMMON LESIONS

VITREOUS ABNORMALITIES

Vitreous opacities may originate from liquefied vitreous (syneresis), blood (haemorrhage), inflammation (uveitis), infection (endophthalmitis) or calcium soaps (asteroid hyalosis). [Bhatt D.C., Bhatt k.d. 1995].

ASTEROID HYALOSIS

Calcium soaps produce bright, point like echoes on scan that may be diffuse or focal. An area of clear vitreous is normally present between the posterior boundary of the lens and the posterior hyaloid. [Fielding J.A. 1993].

VITREOUS HAEMORRHAGE

Second only to cataract as a cause of opaque media. In fresh mild haemorrhage dots and short lines are displayed on the B-scan. The more dense the haemorrhage, the greater the number of opacities are seen on the B-scan. [Dallow R.L.,1974]. If organization of blood occurs, larger interfaces are formed. The blood in the dependent part results in highly reflective pseudo-membranes that can be confused with retinal detachment. A posterior vitreous detachment often occurs in association with a vitreous haemorrhage. [Bronson N.R. 1974].

POSTERIOR VITREOUS DETACHMENT

May be focal or extensive. The posterior hyaloid may separate completely from the posterior pole of it may remain attached to the optic disc. A posterior vitreous detachment is usually smooth and it may be thick especially posteriorly and inferiorly, when blood is layered along its surface [Bhatt D.C., Bhatt K.D.1995].

RETINAL PATHOLOGY

One of the most important role of sonography is in evaluating the retina through opaque media [Coleman D.J. 1972].

RETINAL TEARS

Small retinal tears may be detectable in clinically unexplained vitreous haemorrhage with the scan, a posterior vitreous detachment is often shown adhering to the retinal flap. Shallow retinal detachments may surround the tear which is often a very helpful sign [Baum G.1964].

RETINAL DETACHMENTS

Retinal detachment can be broadly classified into primary or rhegmatogenous in which the cause is considered to be primarily related to specific pathology at the vitreo-retinal interface usually the spontaneous development of small retinal tears associated with degenerative changes in the adjacent vitreous. Detachments are regarded as secondary when the identifiable cause is

considered to be at least as significant or more important than the detachment itself; for example, primary secondary neoplasm, uveitis or resolving vitreous haemorrhage with fibrosis [Sutherland G.R.,Forrester J.V.,Railton R.-1975].

These typically produce a bright, continuous normally folded appearance. When totas or extensive the detachment inserts in to the optic disc and ora serrata. [Forrester J.V., Sutherland G.R.-1974].

The subretinal fluid is usually echolucent. However a subretinal haemorrhage will produce echoes in the subretinal space. They exhibit a more tethered, restricted after movement, however motility can vary. Fresh, bullous detachments and those with a large tear may be mobile, whereas those with posterior vitreous detachment may be stiff. The topographic evaluation is very useful for determining configuration. This may vary from a shallow, flat detachment to a bullous detachment. In addition, extensive detachments often take the form of a funnel which may be open or closed. [Jack R.L. Coleman D.J.-1973].

Detachments that are triangular, T-shaped or that have fixed folds indicate posterior vitreous detachment. Long standing detachments often develop retinal cysts and become partially calcified.[Sutherland G.R.,Forester J.V.& Railton R, 1975].

Special examination technique: intraocular membrane-

Examination	Choroidal detachment	Retinal detachment	Posterior vitreous detachment
Topographic shape	Dome shaped	Linear	V/U Shaped
Location	Periphery(pre-equator)	Variable	Variable
Attachments to optic nerve	No	Yes	Variable
Other	"Kissing choroids" Vortex vein	Folds Breaks	Thicker inferiorly
Kinetic Mobility	Minimal	Moderate	Marked
After Movements	Absent	Minimal to moderate	Marked

[Atta H.R.-1996]

INTRAOCULAR FOREIGN BODIES

In most cases these are readily detectable. B-scan gives a cross section representation of the globe, but require more elaborate equipment to display the information. B-scan provides very accurate localization of the fragment in relation to the adjacent eye structures. In some cases, non-opaque foreign

bodies may be demonstrated by means of the B-scan. [Erkonen W., Kenneth D.D. 1972].

METALLIC FOREIGN BODIES

Typically have an irregular shape, thus producing a very bright signal that persists at low gain setting. There is usually a marked shadowing of the ocular and orbital structures just posterior to the foreign body [Coleman D.J. 1972].

The localization of foreign bodies in the anterior segment can be facilitated by using an immersion technique [Coleman D. J., Dallow R.L., Smith M. E. 1979].

GLASS AND ORGANIC MATERIAL

Glass has some specific characteristics. If glass enters the eye as a sliver, it shows a long thin configuration, when the sound beam strikes it obliquely most of the sound is reflected perpendicular to the flat surface and an extremely high signal obtained. Wood or other organic material can produce a variety of sonographic findings thus their detection may be difficult [Penner R, Passmore J.W. 1966].

CHOROIDAL PATHOLOGY

CHOROIDAL DETACHMENT AND CHOROIDAL HAEMORRHAGE-

Choroidal detachment is caused by hypotony. Low intraocular pressure favours transudation from the blood vessels in to the potential space between

the choroid and sclera, which results in choroidal detachment. Choroidal detachment is frequently accompanied by a partial ciliary body detachment. This event reduces aqueous production and tends to perpetuate the hypotonous condition [Berger B.B et al 1987].

Choroidal detachment is generally seen in the post-operative period following vitreous loss. It is classically seen as a dome shaped membrane not attached to the optic disc. When it progresses, both membranes may touch each others producing the classical 'Kissing choroid' sign [Shammas H.J. 1989].

DISCIFORM MACULAR DEGENERATION

It is extremely common pathologic change in the macular region of the older patient. It is located just temporal to the optic shadow. It is an elevated, irregular placoid lesion that can be best demonstrated from probe position that avoid the iris-lens diaphragm [Levine R.A. 1987].

The sonographic appearance may vary. In haemorrhagic lesions, a bright line of surface echoes may be seen. In fibrotic lesion, an acoustically opaque lesion is seen [Bhatt D.C., Bhatt K. 1996].

CHOROIDAL NAEVUS

A typical choroidal naevus is a flat or minimally elevated oval or circular slate gray lesion [Kanski j.j. 1989].

The incidence of nevi of the choroid in normal individuals varies from 9-11%. The nevi are congenital lesions that usually become clinically recognizable late in the first decade when pigmentation occurs [Yonoff M, 1975].

These are small, elevated lesions not more than, 3mm in size in the peripheral choroid. These lesions need to be monitored for increase in size which may predict malignant change [Bhatt D.C., Bhatt K.-1996].

CHOROIDAL HAEMANGIOMA

Characteristically singular masses found at the posterior pole of the globe. Frequent secondary changes include exudative retinal detachment, cystic degeneration and pigment epithelial mottling of the overlying retina. A useful clinical sign is blanching of the lesion with pressure on the globe [Kanski J.J.1989].

It is an oval or placoid lesion with a sharp anterior border and acoustic solidity, but no choroidal excavation or orbital shadowing [Kanski J.J. 1989].
They are usually seen as small, round, elevated lesions in the posterior choroid. Calcification , may be present in these masses.[Bhatt D.C., Bhatt K, 1995].

CHOROIDAL METASTASES

The commonest tumor producing metastases to the choroid is small cell carcinoma of the lung. Metastases are seen as irregular lobulated masses

increasing from the choroid with multiple hypoechoic areas within [Coleman D.J. 1972].

INTRAOCULAR TUMORS

MELANOMAS

Is a malignant tumor resulting from transformation of melanocytes or naevus cells. It may be pigmented or non-pigmented [Kanski J.J. 1989].

Malignant melanoma of the choroid is the most common intraocular tumor in adults. Patients with ocular or oculodermal melanosis are at increased risk of choroidal melanoma.[Kanski J.J. 1989].

The single most frequent and dangerous tumor in the eye of an adult, is malignant melanoma of choroid and ciliary body [Ossoinig K.C. Till P: 1969].

CHOROIDAL MELANOMA

This is the commonest tumor of the eye in adults. It produces a collar button shaped lesion with a homogenous echo texture.[Bhatt D.C., Bhatt K 1995].

There may be an associated retinal detachment or vitreous haemorrhage secondary to the tumor. A choroidal melanoma may appear occasionally as a flat lesion. It is necessary to differentiate with similar appearances. [Baum G, Greenwood I 1960].

Concomitant retinal detachment is often present. Retina has tendency to remain adherent to the choroidal mass at its highest elevated point, while detaches in surrounding areas. [Shammas H.J.1989].

Sharply defined, strong border echoes are easily detected. Internal reflection just beneath the border echoes characteristically appear weaker. They diminish still further in intensity toward the base of the tumor. This peculiar hollowing effect is characteristic of malignant melanoma. [Fisher Y.L.-1987].

Choroidal melanomas should be differentiated from other choroidoretinal lesions such as choroidal hemangioma, metastatic carcinoma, disciform macular degeneration, choroidal naevus, localised subchoroidal haemorrhage, choroidal detachment and choroidal effusion and choroidal osteoma. [Bhatt D.C.,Bhatt K-1995]

Special examination technique:intraocular tumor

Examination	Melanoma	Metastasis	Hemangioma
Topographic shape	Domed/ Mushroom	Domed/ Bi-domed irregular	Domed
Location	Variable	Near macular	Near disc
Associated with RD	Variable	Common	Rare
Growth	Variable	Rapid	Slow
Quantitative reflectivity	Low/ medium	Variable	High

[Atta H.R. 1996]

RETINOBLASTOMA

A primary malignant tumor of childhood, 90% of patients diagnosed before 5yrs of age. It may be bilateral in 25% to 30% of cases with multiple sites of origin in the same eye and fellow. In patients giving a family history, a propensity of secondary malignancies usually osteogenic sarcomas is noticed [Fielding J.A.-1993].

The common growth patterns are endophytic, exophytic and diffuse type. The spread occurs along the optic nerve with subarachnoid extension or choroidal invasion. Distant secondary disorders of bone marrow, liver and lymph mode may be present [Shammas H.J. 1989].

Small tumors are smooth and dome shaped. However large tumors are highly irregular and heterogeneous in texture. Usually it comes out from one site of retina and fills the posterior segment. Calcification is typical feature of retinoblastoma and is accompanied with acoustic shadowing [Sterns G.K.,Coleman D.J. and Ellsworth R.M. 1974].

Clinically, almost all cases of retinoblastoma present with leukoria (white pupils). Many other conditions can cause leukoria and should be considered in the differential diagnosis of retinoblastoma [Gitter K, Meyer D, White R, 1968].

Retinopathy of prematurity(ROP)

This condition generally occurs following oxygen therapy in the neonatal age group and is usually bilateral. There is either V-shaped retinal detachment or dense fibrotic membranes in the retrolental space. There could be associated haemorrhage or cholesterol debris in the subretinal space [Atta H.R. 1996].

Persistent hyper-plastic primary vitreous (PHPV)

This is a unilateral condition in which a fibrotic band is seen extending from the lens to the optic disc. Due to the fibrotic band the axial length of the eye is reduced. A highly reflective band is seen extending from the lens to the optic disc. Retinal detachment may be seen in about 20%of the patients. It is sometimes possible to detect the presence of blood flow in this band due to persistence of the hyaloid artery [Atta H.R. 1996].

Coat's disease

This is a unilateral condition showing an exudative retinal detachment. The exact cause of this condition is not known. There is usually an open funnel retinal detachment with a retro-retinal exudate [Bhatt D.C. Bhatt K, 1995].

Cysticercosis and Toxocara

Cysticercosis is generally unilateral and more commonly seen in the muscles of the eye rather than the vitreous cavity. The presence of a cyst with scolex is diagnostic of this condition [Pohaczevsky R, Sugar A, 1979].

Toxocara infection is generally seen as a peripheral granuloma with secondary retinal detachment.

Echographic diagnosis of leukoria-

Retinoblastoma	**Coat's disease**	**Retinopathy of prematurity**	**Persistent hyperplastic primary vitreous**
Unilateral/ bilateral	Unilateral	Bilateral	Unilateral
Solid mass	RD	RD	Band (s)
Calcification	Subretinal opacities	Retinal loops	Prominent ciliary body
Normal axial length	Normal axial length	Short/normal axial length	Short axial length

[Atta H.R. 1996]

OPTIC NERVE TUMORS

MENINGIOMA

Meningiomas are slow growing tumors arising from the arachnoid cells. It can occur in the orbit as a primary neoplasm or as an extension from an anterior or middle cranial fossa meningioma. When seen in younger patients they are usually associated with neurofibromatosis [Wright J.E., 1977].

Meningioma, a tumor arising from the meninges can produce an exceedingly diverse array of ocular signs and symptoms [Levine R.A., Rosemberg. M.A. Robb M.F.-1987].

Unlike the intraocular meningioma the orbital perioptic meningioma occurs in children as well in adults [Brandt D.E.Beinser D.H.-1970].

Primary intraocular meningioma produce early visual loss associated with optic disc oedema or atrophy. It produces early visual loss by compressing the optic nerve[Wright J.E.-1977].

The meningioma of ophthalmic importance in childhood usually arises from the intraorbital meninges of the optic nerve. In contrast the meningioma of adulthood usually evolves intracranially (eg. Sphenoid ridge). Orbital involvement secondarily leads to proptosis [Sterns W.E.1973].

Secondary orbital involvement by a meningioma is usually associated with greater proptosis and less visual impairment than primary variety. In such instances the proptosis is due to hyperostosis and osteoblastic destruction of the sphenoid bone often combined with compression of the venous return from the orbit.

They are hyperechoic, symmetric, tubular thickening or fusiform enlargement of the optic nerve occasionally a localized eccentric mass is seen.

OPTIC NERVE GLIOMA

Is a benign astrocytic and typically occurs in the first decade of life [Chutorian A.M., et al-1964]. Two distinct patterns of clinical signs occur, depending on whether there is intracranial involvement [Lloyd L.-1973].

1-Visual loss, optic atrophy and signs of increased intracranial involvement may be seen.

2-Visual loss papilloedema and proptosis characterize intraorbital optic nerve glioma.[Levine R.A.-1987]

These are the commonest benign orbital neoplasms in children. In adults (middle age) they are usually malignant. When bilateral, neurofibromatosis should be suspected [Coleman D.J., Lizzi F.L. Jack R.L.-1977].

On sonography; tubular, fusiform or eccentric lobulated enlargement with well defined smooth margins is seen. It is homogenous, usually isoechoic to the optic nerve. Cystic changes may be seen and calcification is rare [Shammas H.J., 1989].

Material & Methods

This cross sectional study comprised a total of 100 patients from both inpatient and outpatient department in M.L.B. Medical college, Jhansi. The study was conducted from April 2001 to January 2003. The ultrasound examination was performed in the Department of Radio-Diagnosis.

SELECTION CRITERIA

The patients were selected either for pre-surgical evaluation or for diagnostic purpose. The indicators used to select the patients were-

1- Inability to visualize the posterior segment due to Corneal lesions, Irregular or poorly dilated pupils, Vitreous opacities, Lenticular opacities.

2-To confirm a diagnosis made clinically.

3-A history of an associated ocular inflammatory disease or any findings suggestive of the same were also thought to be indicators.

DATA COLLECTION PROCEDURE

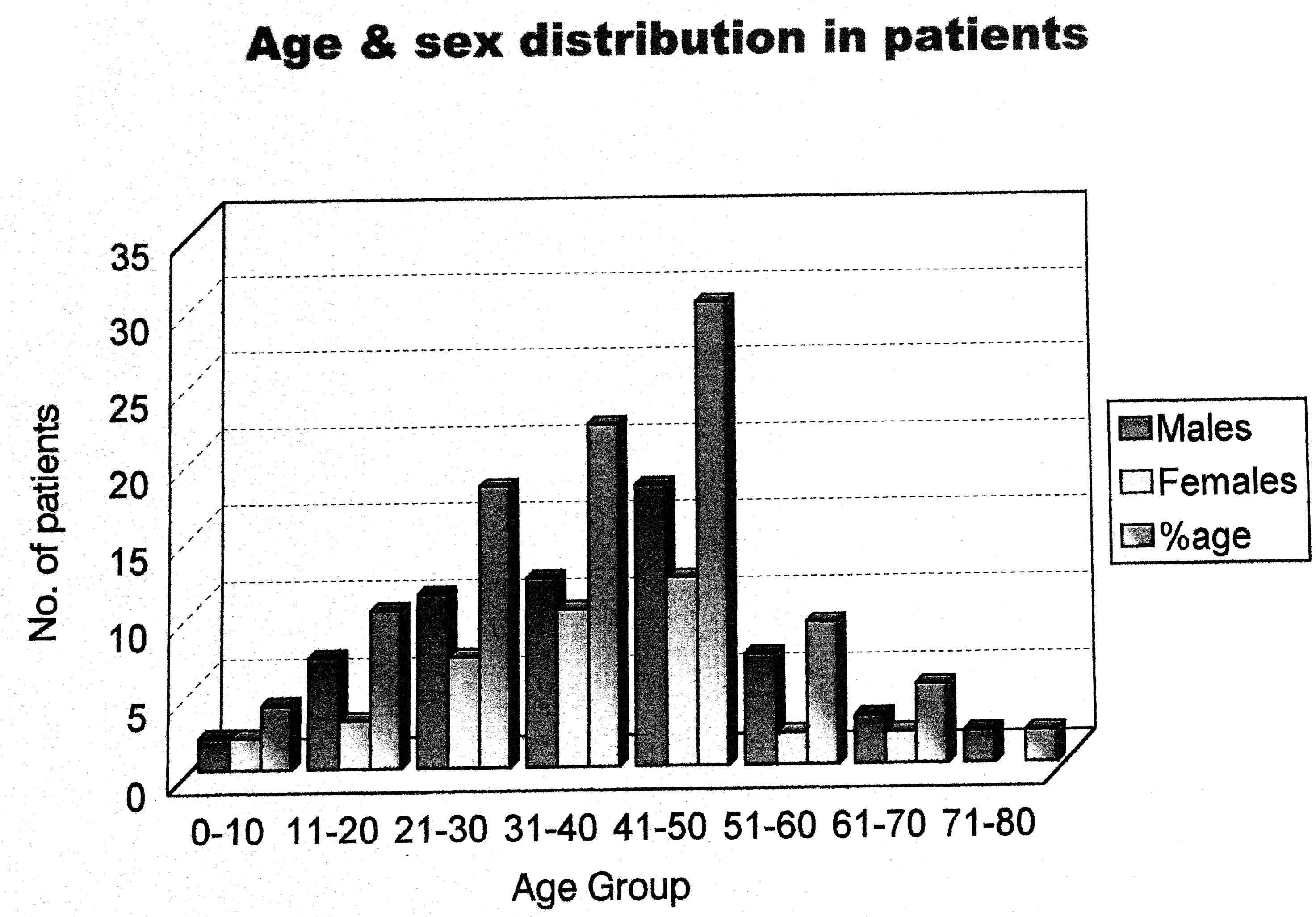
A complete clinical data of the patient's signs and symptoms were taken. Findings of other clinical investigations and follow up were noted. No account was taken of gender or systemic health of the patient.

All the patients were subjected to ultrasound examination after taking informed consent for the same. The data was collected as per detailed proforma prepared for the study and records maintained.

EQUIPMENT

In this study ultrasonography was performed using Real time high resolution phased array linear probe of 11M Hz. Vertical, Horizontal and Oblique image were made.

Observation


Age & sex distribution in patients
35
30
25
20
15
10
5
0
No. of patients
0-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
Age Group
Males
Females
%age

The present study was carried out in the department of Ophthalmology and Radiology, M.L.B. Medical college; Jhansi. Patients selected were those who seek medical advice for eye ailment in out door patient and emergency of ophthalmology department.

A total of 100 patients with various ocular and orbital abnormalities up to the age groups of 80 years were examined.

[TABLE-1]

AGE AND SEX DISTRIBUTION IN PATIENTS

Age groups(yrs.)	**Males**	**Females**	**Total**	**Percentage (%)**
0-10	2	2	4	4%
11-20	7	3	10	10%
21-30	11	7	18	18%
31-40	12	10	22	22%
41-50	18	12	30	30%
51-60	7	2	9	9%
61-70	3	2	5	5%
71-80	2	-	2	2%
Total	62	38	100	–
Percentage	62%	38%	–	100%

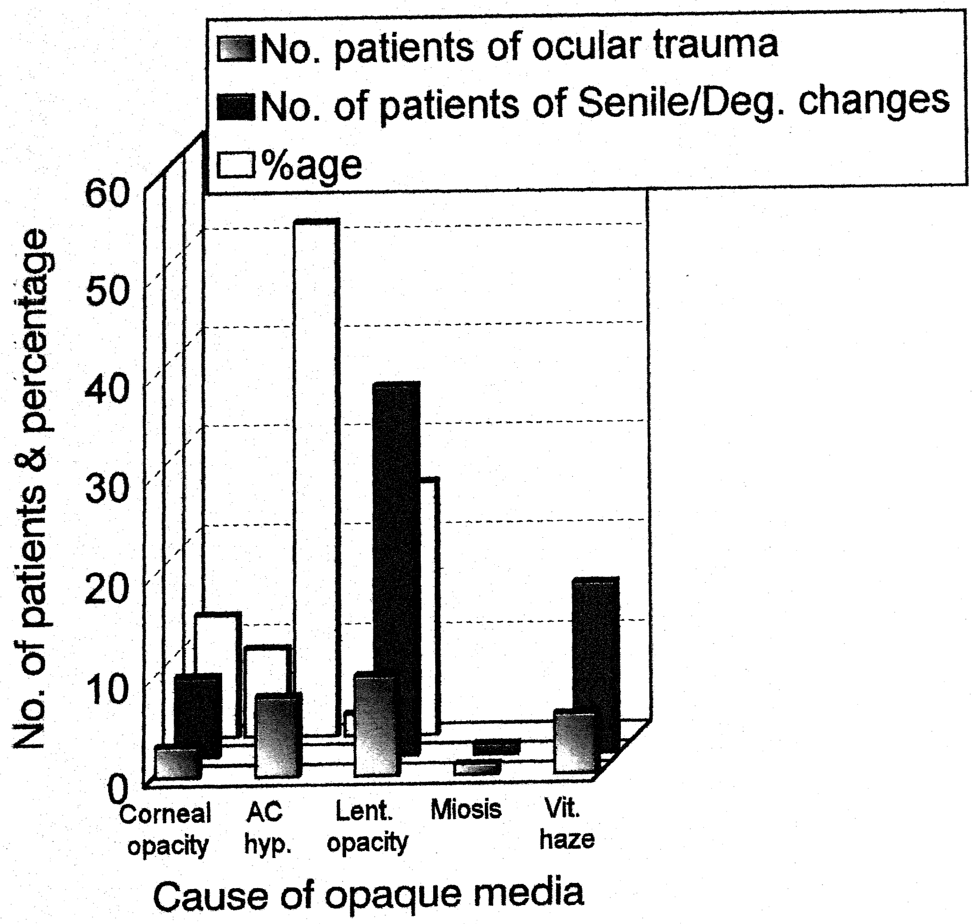
This table shows that maximum number of patients were in age group 41-50 yrs. (30%) followed by 31-40 yrs. (22%) and 21-30 yrs. (18%); while least number of patients were found in age group 71-80yrs. (2%).

Out of 100 patients, male were 62% and 38% were female.

Among these patients 91 patients were advised for B-scan ultrasonography due to presence of opaque ocular media while remaining 9 patients had clear media.

Road side vehicular accidents, occupational eye hazards and sports injury i.e. ocular trauma is responsible for opaque ocular media in 28 patients (30.76%) while in the remaining 63 patients (69.24%) senile changes/ degeneration/ dystrophy were the factors for opaque media.

Basis for ultrasonic examination



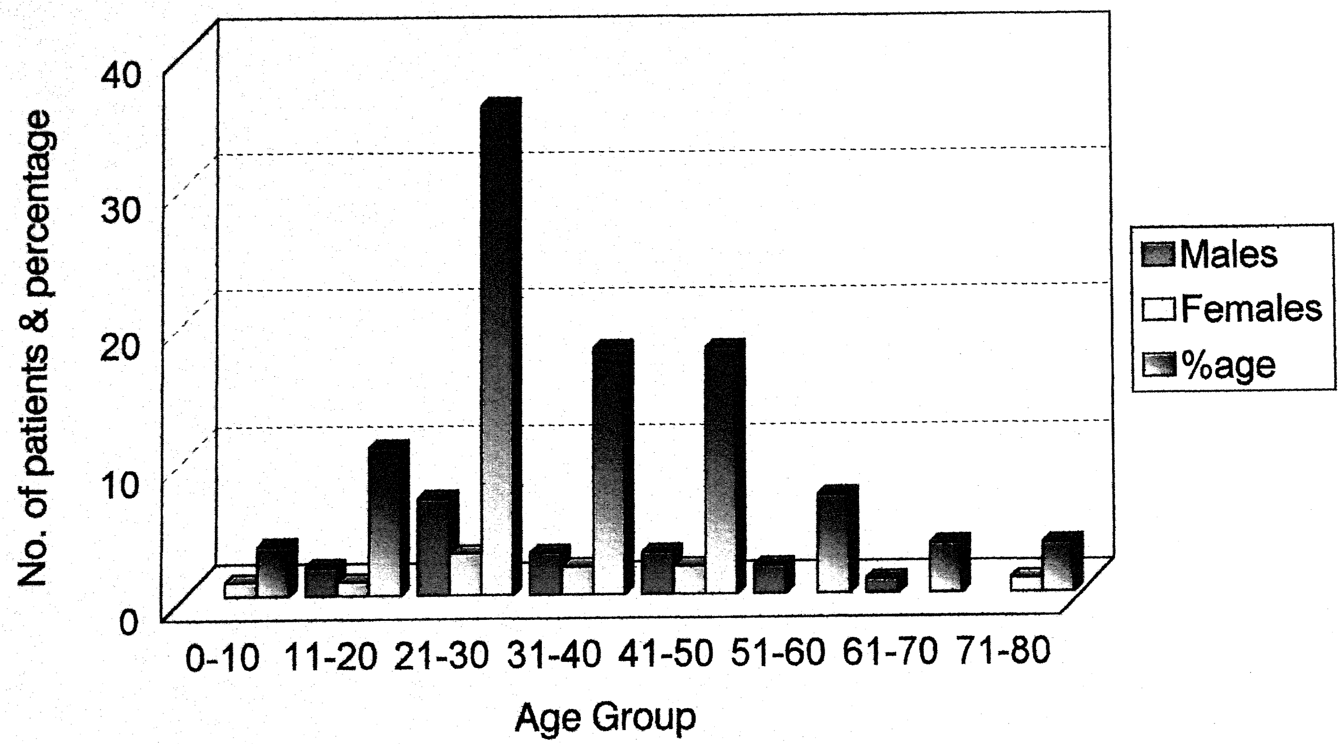
[TABLE-2]

BASIS OF REFERRAL FOR ULTRASONIC EXAMINATION-

Opaque media	No. of Pt. of Ocular trauma	No. of Pt. of Senile/Deg./Dys. changes	Total	Percentage%
1-Corneal opacity	3	8	11	12.08%
2-Anterior chamber hyphaema	8	-	8	8.79%
3-Lenticular opacity/Dense cataract	10	37	47	51.64%
4-Miosis	1	1	2	2.19%
5-Vitreous haze	6	17	23	25.27%
–	28	63	91	100%

Table-2 shows that among 91 patients of opaque ocular media , most common responsible factor for opaque media was lenticular opacity/ dense cataract in 47 patients (51.63%) followed by vitreous haze in 23 patients (25.27%).

Age & sex distribution in ocular trauma patients



[TABLE-3]

AGE & SEX DISTRIBUTION IN OCULAR TRAUMA PATIENTS-

Age groups(yrs.)	Males	Females	Total	Percentage
0-10	-	1	1	3.57%
11-20	2	1	3	10.71%
21-30	7	3	10	35.71%
31-40	3	2	5	17.85%
41-50	3	2	5	17.85%
51-60	2	-	2	7.14%
61-70	1	-	1	3.57%
71-80	-	1	1	3.57%
Total	18	10	28	–
Percentage	64.28%	35.72%	–	100%

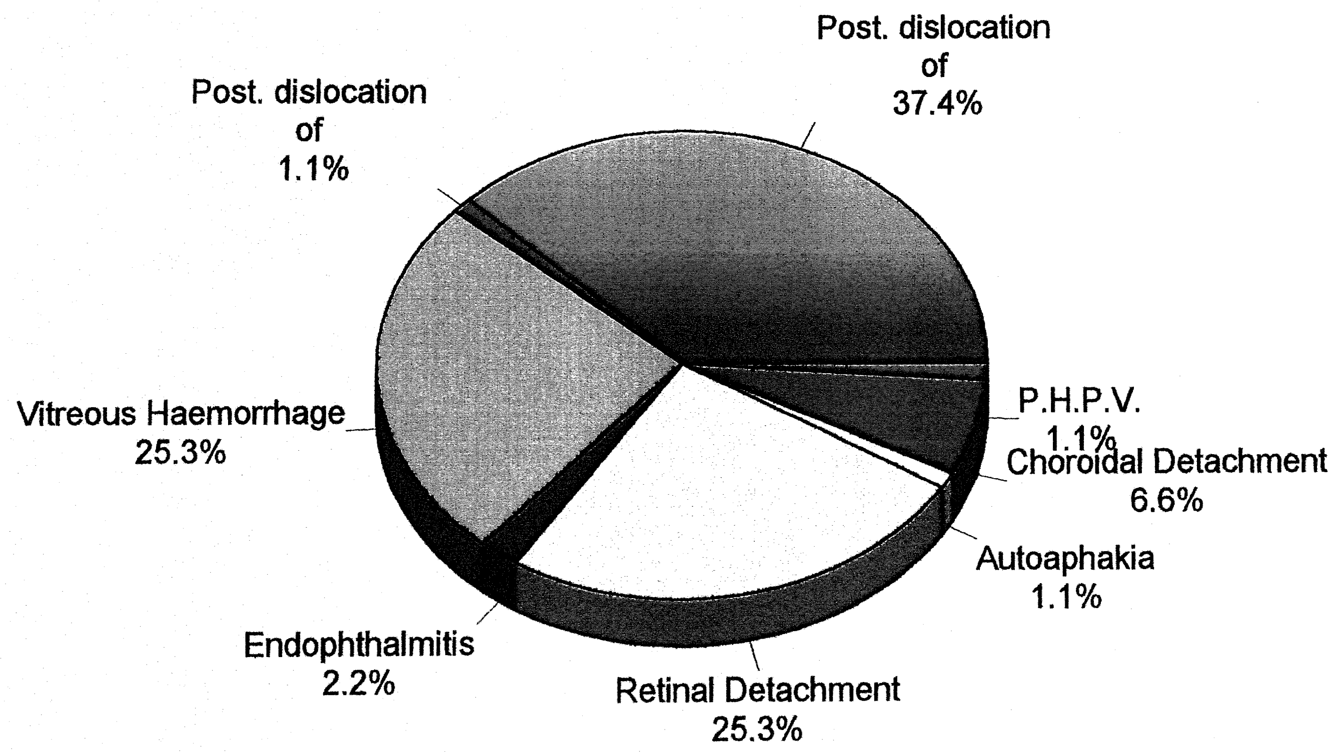
Table 3 shows that out of 28 patients of ocular trauma, 18 patients (64.28%) were male while 10 patients (35.72%) were female and maximum no. of patients were in age group of 21-30yrs.,including 35.71%. So this study shows that maximum no. of ocular trauma patients were young male.

Pie diagram shows that Rt. Eye is more commonly involved in trauma, 17 patients (60.72%) than Lt. Eye 11 patients (39.28%).

Total 91 patients of opaque ocular media were advised for B-scan ultrasonography. Aim of B-scan in these patients was to rule out any

concurrent posterior segment pathologies. On scanning 58 patients (63.73%) showed one or the other posterior segment pathology while in the remaining 33 patients (36.27%) no posterior segment pathology was found and classified as normal. Various posterior segment pathologies are described here.

Distribution and percentage of posterior segment pathology



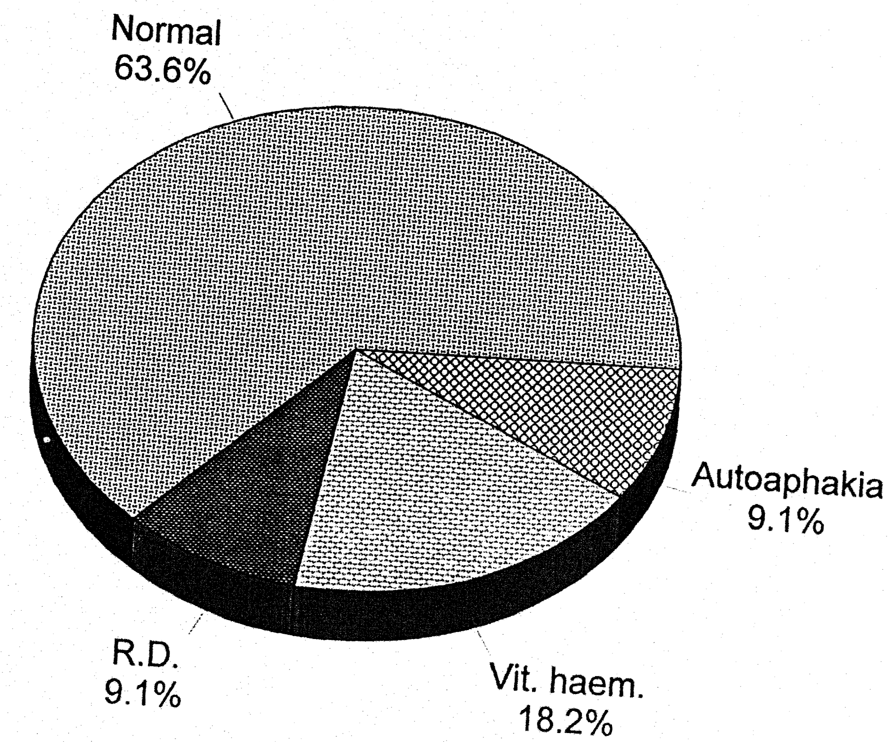
[TABLE-4]

DISTRIBUTION AND PERCENTAGE OF POSTERIOR SEGMENT PATHOLOGY		
Posterior segment Pathology	**No. of patients**	**Percentage**
Normal	34	37.36%
Vitreous Haemorrhage	23	25.27%
Retinal Detachment	23	25.27%
Autoaphakia	1	1.09%
Choroidal Detachment	6	6.59%
P.H.P.V.	1	1.09%
Endophthalmitis	2	2.19%
Posterior dislocation of lens	1	1.09%
Total	**91**	**100%**

Table 4 shows that most of the patients of opaque ocular media (34 patients, 37.36%) have no posterior segment pathology. Vitreous haemorrhage and retinal detachment was present in 23patients, 25.27%.

Now these posterior segment pathology are tabulated with their cause of opaque ocular media-

Distribution and percentage of posterior segment pathology in patients of corneal opacity



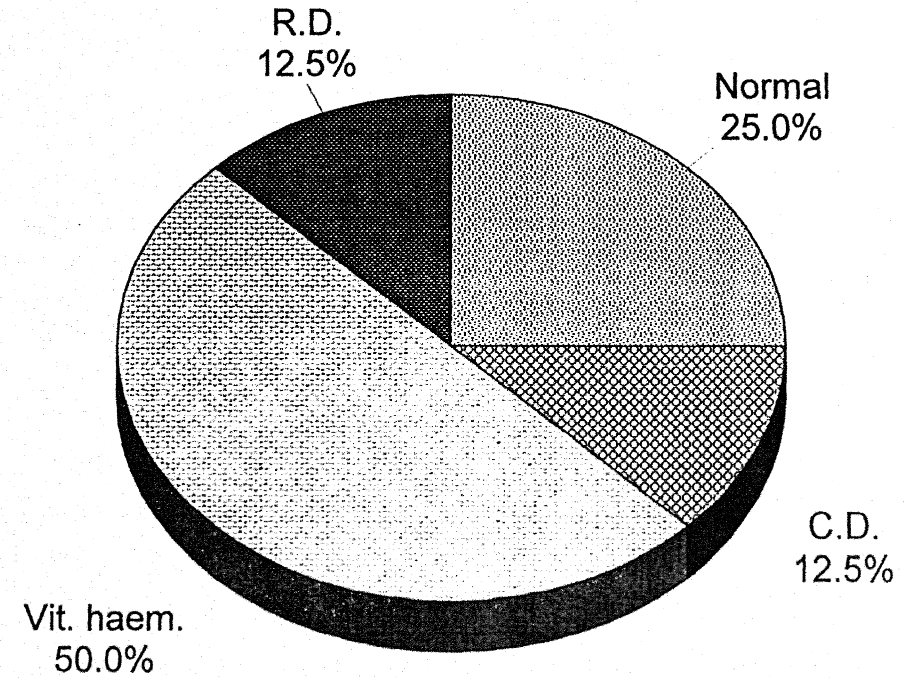
[TABLE-5]

DISTRIBUTION OF TYPE OF LESION IN PATIENTS OF CORNEAL OPACITY

S. NO.	Type of lesion	No. of cases	Percentage%
1	Normal	7	63.63%
2	Vitreous haemorrhage	2	18.18%
3	Retinal detachment	1	9.09%
4	Autoaphakia	1	9.09%
Total	–	**11**	**100%**

Table-5 shows that maximum no. of patients (63.63%) of corneal opacity had no posterior segment pathology.

Distribution and percentage of posterior segment pathology in patients of anterior chamber hyphaema



[TABLE-6]

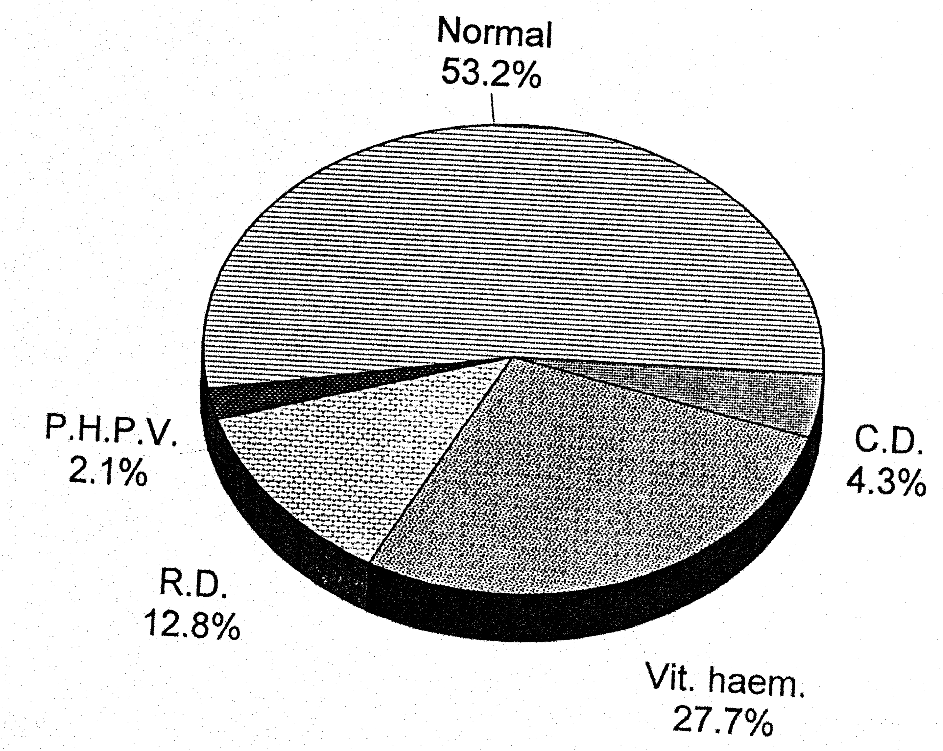
DISTRIBUTION OF TYPE OF LESION IN PATIENTS OF ANTERIOR CHAMBER HYPHAEMA

S. No.	Type of lesion	No. of cases	Percentage%
1-	Normal	2	25%
2-	Vitreous haemorrhage	4	50%
3-	Retinal detachment	1	12.5%
4-	Choroidal detachment	1	12.5%
Total	–	**8**	**100%**

This table shows that patients having Anterior chamber hyphaema have maximum number (50%) of concurrent posterior segment vitreous haemorrhage.

On comparing this table with Table-2 it is also clear that in all the cases, the cause of anterior chamber hyphaema is trauma.

Distribution and percentage of posterior segment pathology in patients of lenticular changes



[TABLE-7]

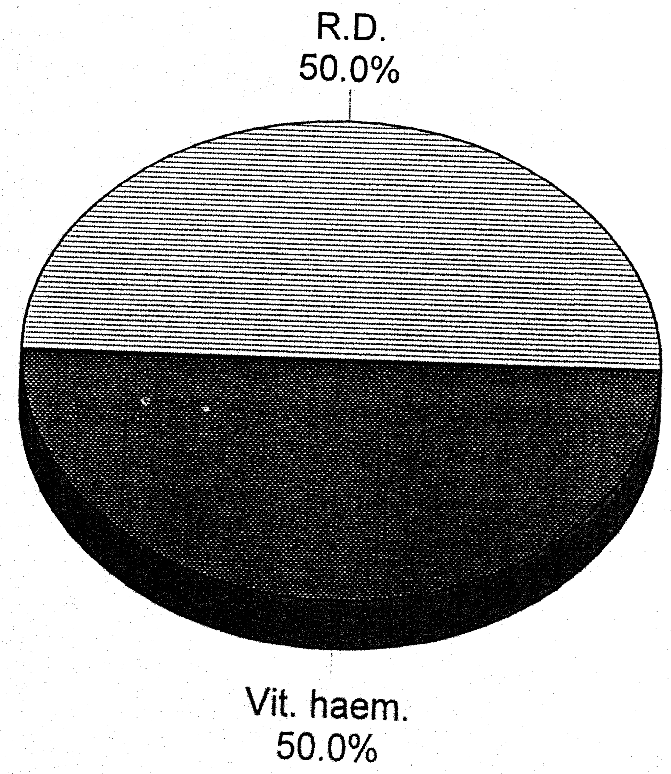
DISTRIBUTION OF TYPE OF LESION FOUND IN PATIENTS OF DENSE CATARACT

S.No.	Type of lesion	No. of cases	Percentage
1.	Normal	25	53.19%
2.	Vitreous Hemorrhage	13	27.65%
3.	Retinal detachment	6	12.76%
4.	PHPV	1	2.12%
5.	Choroidal detachment	2	4.25%
Total		**47**	**100%**

*Persistence hyperplastic primary vitreous.

Again table-7 shows that maximum no. of patients (53.19%) with dense cataract have no concurrent posterior segment pathology, while most common lesion detected by B-scanning ultrasound is vitreous haemorrhage i.e. 27.65%.

Distribution and percentage of posterior segment pathology in patients of miosis



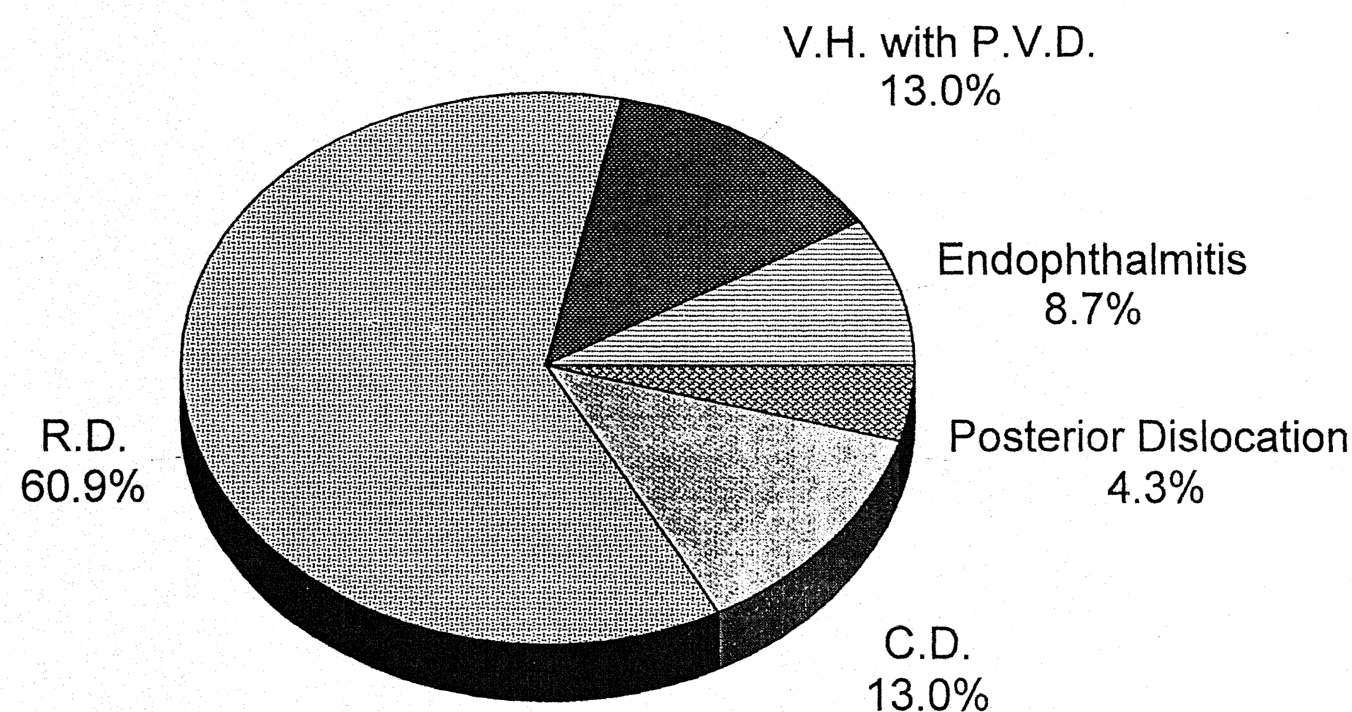
[TABLE-8]

DISTRIBUTION OF TYPE OF LESION IN PATIENTS OF MIOSIS

S. No.	Type of lesion	No. of cases	Percentage%
1-	Vitreous haemorrhage	1	50%
2-	Retinal detachment	1	50%
Total	_	**2**	**100%**

Table-8 shows equal incidence of vitreous haemorrhage and retinal detachment in patients of opaque ocular media due to miosis i.e. 50% each.

Distribution and percentage of posterior segment pathology in patients of vitreous haze



[TABLE-9]

DISTRIBUTION OF TYPE OF LESION IN PATIENTS OF VITREOUS HAZE

S. No.	**Type of lesions**	**No. of patients**	**Percentage%**
1-	**Endophthalmitis**	**2**	**8.69%**
2-	V.H.with P.V.D.	3	13.04%
3-	Retinal detachment	14	60.86%
4-	Choroidal detachment	3	13.04%
5-	Posterior dislocation of lens	1	4.34%
Total	–	**23**	**100%**

Table -9 shows that maximum no. of patients of vitreous haze have maximum incidence of concurrent retinal detachment i.e.60.86%.

From all these Tables, Bar diagrams, Pie diagrams it is clear that a larger number of male patients were studied than female patients

A smaller sub population in the lower age group which probably reflects the lesser incidence of both the opacities as well as vitreo-retinal disease at this age group. Bulk of the patients (30%) fit in to the range from 41-50 years which on examination shows significant opacities especially lenticular and vitreo-retinal.

The different categories of ocular and orbital problems with opaque media are discussed separately in order to evaluate the reliability of the diagnosis reached by ultrasound alone.

A-Normal-The largest group in our series of 100 patients is the group diagnosed as normal in 34 patients but presented with opaque media (lenticular opacities) due to trauma or cataract. These were referred for B-Scan to rule out any vitreo-retinal abnormality as pre operative evaluation, as the opaque media did not allow a clinical fundus examination.

B-Vitreous haemorrhage-The second group diagnosed was the group with vitreous haemorrhage in 23 patients. The general character of vitreous haemorrhages can be shown to vary ultrasonically. They may vary in degree from diffuse solidity, as in cases of recent trauma with massive haemorrhage, to isolated fibrinous changes appearing as low amplitude dots scattered in the vitreous. They may vary in character, such as fibrinous bands that can be outlined, and when seen with retinal detachment can indicate the pathophysiology of the detachment.

C-Retinal detachment-The third group of patients were those diagnosed as having retinal detachment and was seen in 23 patients (in our study among total 91 patients of opaque media incidence of vitreous haemorrhage and retinal detachment was found to be equal i.e. 23 patients.) Out of 23 patients 16 patients had complete retinal detachment, whereas 7 patients had partial retinal detachment. These patients were referred for two principal reasons:

either because the fundus could not be visualized due to opaque media or because there was a questionable tumor behind a retinal detachment. It is almost always possible to ascertain the presence of retinal detachment with ultrasound.

There was 100% reliability of the ultrasonic diagnosis of retinal detachment in the group 23 patients evaluated.

D-Autoaphakia- Is the absence of lens without any surgery either due to congenital defect or due to trauma. On B-scanning there was only a thin membrane across pupillary margin and there was history of trauma 10 years old.

E-Choroidal detachment- Normally choroidal pattern can be barely detected as a slightly weaker echo layer just inside scleral and orbital fat reflection. When thickened as a result of oedema in trauma, the spongy choroidal pattern incrases and is easily visible. Choroidal detachment occurs anteriorly and demonstrates a convex dome shaped pattern which is limited anteriorly to ciliary body and posteriorly at exit foramina of vortex veins. In our study among total 6 cases of choroidal detachment 4 cases are typical, 1case showed unilateral choroidal detachment along with vitreous haemorrhage and last case showed C.D. along with R.D.

Remaining conditions like Persistent hyperplastic primary vitreous (P.H.P.V.), inflammatory condition like Endophthalmitis, posterior dislocation of lens can be easily diagnosed with the help of ultrasound.

Remaining 9 patients having clear media were advised for B-scanning ultrasound for confirmation of diagnosis after routine eye checkup with following results-

A-INTRAOCULAR TUMOR

Among 2 patients of intraocular tumor, 1 child (Age 2 yrs.) had Retinoblastoma while another child had Retrobulbar mass (giving the false impression of Retinoblastoma on clinical examination).

zB-INTRAOCULAR FOREIGN BODY (I.O.F.B.)

1 Patient showed an irregular glass foreign body in posterior vitreous cavity while 2 patients showed metallic foreign body; resulting in posterior shadowing of intraocular and intraorbital structure. In the 3rd case it was not detected by ultrasound and later it was found to be embedded in sclera and is of plastic nature.

C-EXOPHTHALMOS

These both patients of Grave's Disease had clinically significant exophthalmos; B-scan was advised for seeing the changes in medial rectus muscle or any other extraocular muscles but no changes was seen and scan was within normal limit.

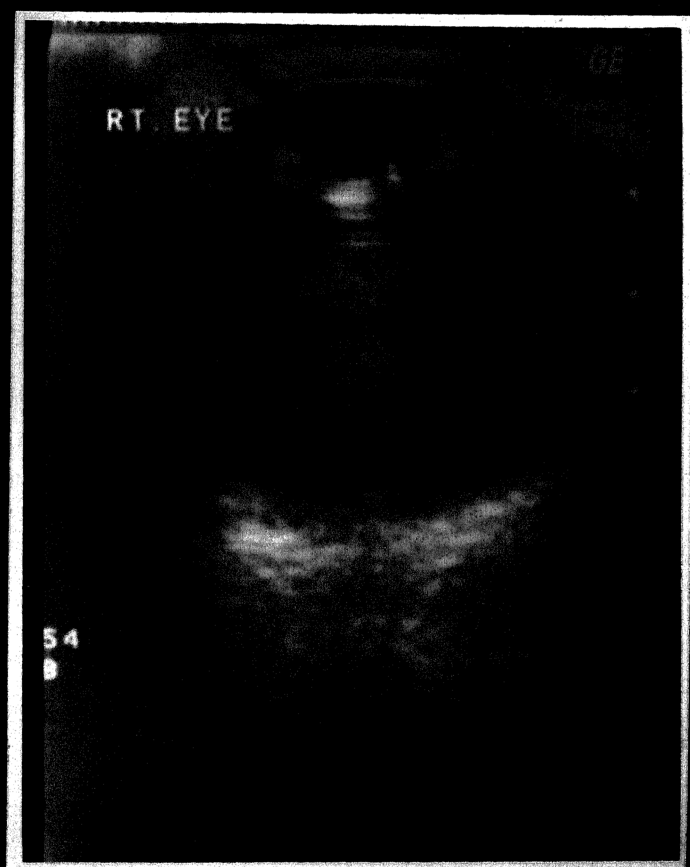
D-POST- OPERATIVE

On 3rd post-operative day this patient gave the history of decrease of vision and seeing black curtain in front of eye, so patient was advised for B-scan to rule out retinal detachment and was found to have mild retinal detachment in inferior quadrant.

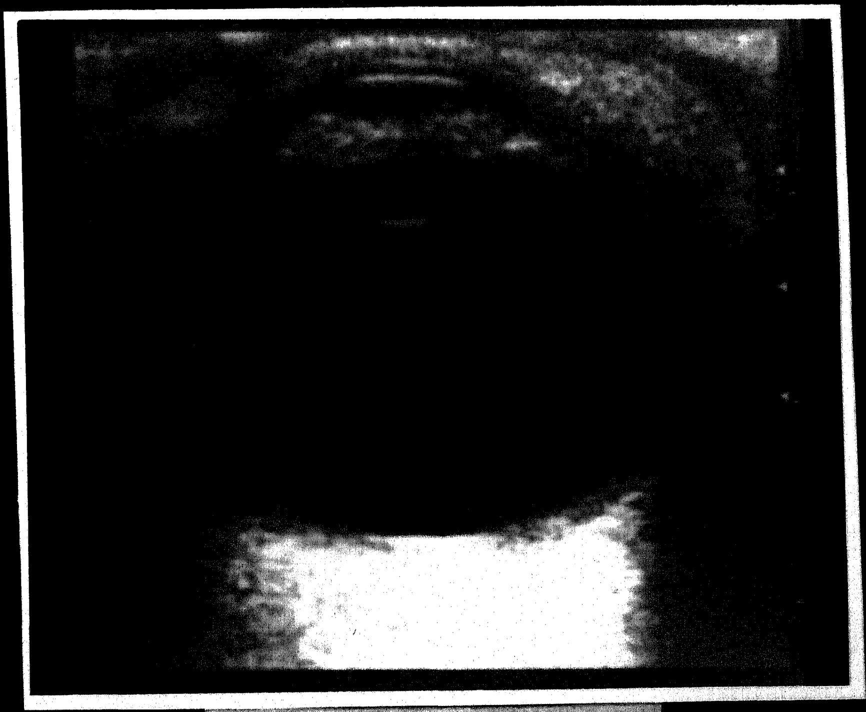
E-ANTERIOR DISLOCATION OF LENS

On ultrasonography only depth of anterior chamber was found to be increased.

Normal B-Scan.



Pseudophakia with Reverberation artifact.



Anterior chamber hyphaema.

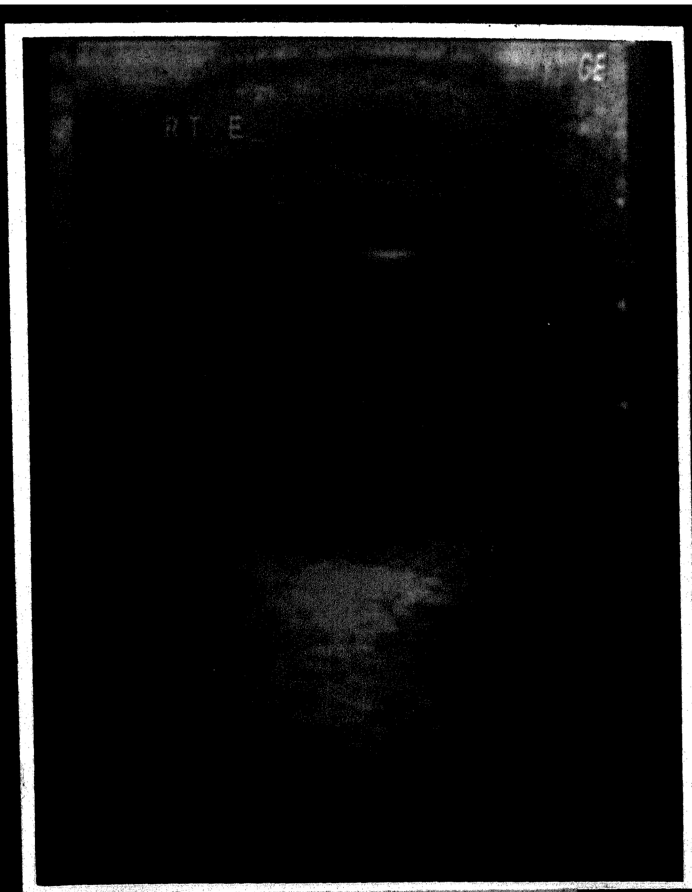
Dense cataract.

Autoaphakia.

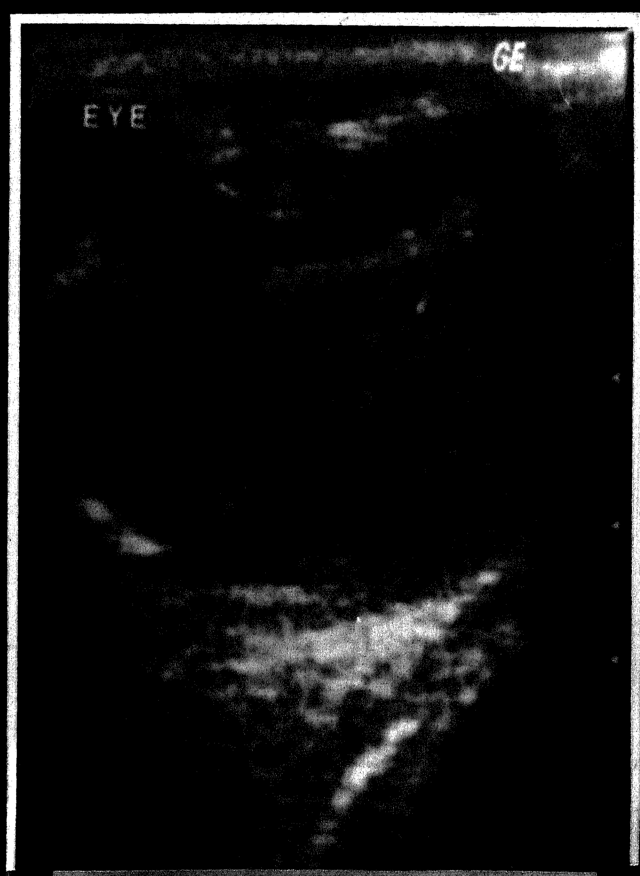
Persistent Hyperplastic Primary Vitreous.

Anterior dislocation of Lens.

Posterior dislocation of Lens.

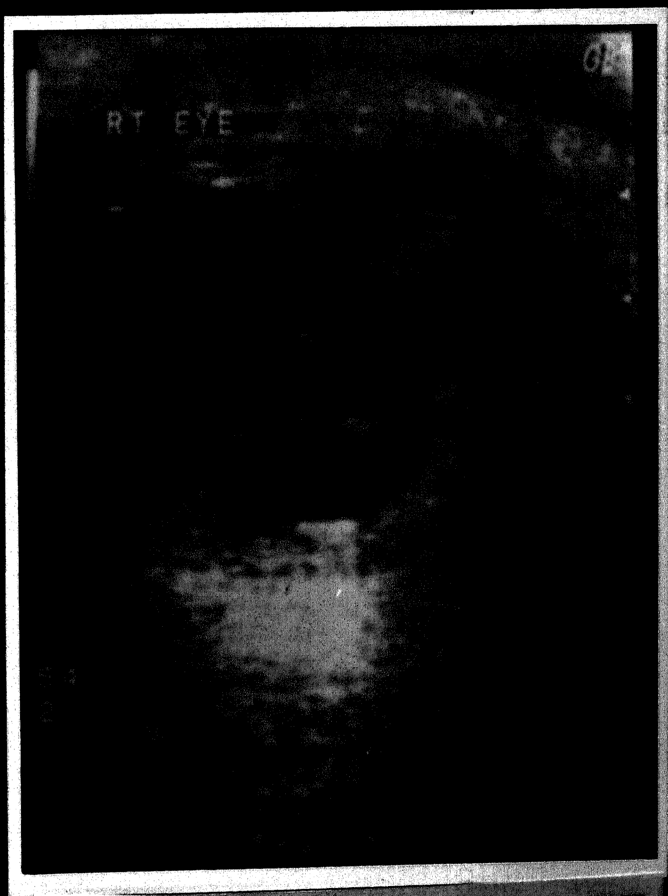


Early vitreous haemorrhage.



Late V.H.with membranous cavity.

Retinal detachment.



Unilateral Choroidal detachment with V.H.

Retinoblastoma.

Retrobulbar abscess.

Metallic FB with typical posterior shadowing.

Multiple Foreign Body.

Discussion

There has recently been a greater awareness of the sub-group constituted by such patients with corneal, lenticular or vitreal opacities on whom a pre-surgical evaluation for various diagnostic purposes is essential.

The possibility of undetected fundal lesions manifesting intra or post operative is also thus negated. The possibility of operating on a patient with such a lesion is obviated, thus sparing the surgeon of any legal or technical problems, while treating. A discrete population of patients with lenticular or other opacities has been studied to objectively analyze the presence, incidence, and other characteristics of abnormality.

In such patients, diagnostic B-scan ultrasonography is a non-invasive ,well tolerated safe procedure with no toxicity which aids the ophthalmologist by demonstrating the intraocular contents. B-scan provides quick, sensitive and specific information regarding the status of the posterior segment.

The aim of the study is to evaluate the reliability of B-scan ultrasound in ocular and orbital abnormalities.

Our study consisted of ultrasonographic evaluation of 100 patients who were in and out patients at M.L.B.Medical college and hospital.

Generally, patients are referred for ultrasonic evaluation of either ocular or orbital pathologies. Those referred for ocular evaluation can be grouped in the

following categories of ocular problems: retinal detachment, vitreous haemorrhage, trauma, choroidal detachment, I.O.F.B.(Intraocular foreign body) and intraocular tumors. Detection of these abnormalities cannot be visualized clinically when the cornea, lens or vitreous is opaque and this has been a limitation of diagnosis in ophthalmology in the past. Ultrasound has come a big way in diagnosing these abnormalities.

In a similar study, among an unselected series of 221 patients seen in Southampton at the Ultrasound Clinic of Manhanttan Eye, Ear and Throat Hospital. [Bronson N.R.-1974].

Patients referred for ultrasonic examination.

Type of referral	Coleman D.J. study(No.)	Present study(No.)
Normal	42	34
Retinal detachment	44	23
IOFB	23	3
Vitreous haemorrhage	22	23
Intraocular tumour	19	2
Pthisis bulbi	7	-
Vitreous floaters	12	-
Orbital abnormality	16	1
Miscellaneous*	36	9
Total	221	95

*Miscellaneous condition includes choroidal detachment, vitreous collection, posterior vitreous detachment, coloboma and inflammatory conditions.

A similar pattern of reference was noticed in our study as well.

Up to the age group of 80 years study was done. The growing field of paediatric ophthalmology has led to many advances in diagnosis and

management and this is shown in 14% of children. Here the ultrasound provides a safe effective and reliable method to asses the posterior segment, both in optically opaque media as well as in children who will not allow the direct visualization of the fundus. The findings in this group included IOFB, retinal detachment, vitreous haemorrhage secondary to ocular trauma. However, the ever present possibility of retinoblastoma mandates a B-scan in such patients. But we are able to find only one case in our series.

In the middle age group from 21 to 40 years, 40 patients (i.e.40%) were studied. These were mainly cases of trauma, concomitant ocular inflammatory disease or lenticular opacities which were either past or acquired opacities whether traumatic, complicated or studied as pre-senile cataracts. The diagnosis in this age group included vitreous haemorrhage secondary to ocular trauma, retinal detachment and choroidal detachment. A female patient with a history of heaviness, increase in size of eye and proptosis, was found to have a retrobulbar mass diagncsed ultrasonographically.

In the age group of 41 to 60 years, 39 patients were studied. Most of the patients had senile cataract and referred for B-scan ultrasound for pre-operative evaluation.

7 patients were studied older than 60 years. In this group also most of the patients had senile cataract. In one case, vitreous haemorrhage with secondary retinal detachment was seen. In another case of ocular trauma, complete retinal detachment and choroidal detachment was noticed.

The numerical analysis of our cases with reference to the ultrasonographic diagnosis showed the majority of our cases to be normal with respect to the scan.

The second group of 23 patients of vitreous haemorrhage presented mostly with ocular trauma and few with history of systemic illness such as hypertension and diabetes mellitus.

The third group of 23 patients of partial or total retinal detachment, all of whom were abnormal with respect to retinal function, pupillary reaction.

Two patients of IOFB detected were confirmed and removed surgically. One case was reported as false negative. But on surgery, the foreign body was located in the sclera and was of plastic nature.

The present report was designed to present the type of cases referred for ultrasound and the reliability of ultrasound in providing the proper anatomic diagnosis.

Ultrasound does not provide a tissue diagnosis, although frequency and reflectance characteristics do provide insight in to the character of a lesion. Repeat examination, showing changes at a later time, can add even more information.

Even considering these factors, the overall reliability of B-scan ultrasonography, and the indisputable value of the information provided, make B-scan evaluation of eyes with opaque media an essential diagnostic test.

Conclusion

CONCLUSION

B-scan ultrasound is simple, cost effective, accurate, radiation free modality; which has some additional advantages over conventional radiographic techniques. It is very important diagnostic method to detect any posterior segment pathology in whom fundus visualization is not possible to make accurate diagnosis, to plan management accordingly and to predict visual outcome. Ultrasound evaluation provides the surgeon with the maximum information available prior to surgical exploration, enabling optimal patient management.

In this study, following conclusions were drawn:

1- Male patients were 62% as compared to female patients (38%).
2- Maximum no. of patients were in age group 41-50 years (30%) followed by 31-40 years (22%) and 21-30 years (18%).
3- Maximum no. of ocular trauma patients were in age group 21-30years and males were more commonly involved (64.28%) than female (35.72%) i.e. young males.
4- Right eye were more commonly involved (60.72%) than left eye (39.28%) in patients of ocular trauma.
5- Out of 91 patients of opaque media, in 34 patients (37.36%) no posterior segment pathology was found.
6- Out of 91 patients of opaque media, in 57 patients (62.64%) different posterior segment pathologies were detected.
7- Most common pathology detected was vitreous haemorrhage and retinal detachment with equal incidence i.e. 25.27%.

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